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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

ROANE, AARON F

ART UNIT	PAPER NUMBER
3739	10

DATE MAILED: 03/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/914,375

Applicant(s)

CRONIN, NIGEL

Examiner

Aaron Roane

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 13-20, 23-35 and 38-44 is/are rejected.
- 7) ☒ Claim(s) 7-12, 21, 22, 36 and 37 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6 ✓
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election with traverse of species #3 in Paper No. 9 is acknowledged. The traversal is on the ground(s) that the "forwards transmission" is simply a further limitation of the "near-field" limitation.

The traversal arguments are persuasive and therefore all of the claims (1-44) will be examined.

### ***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "340" has been used to designate both "antenna" (or "conductor") of figure 5 and a one of "several sections" in figure 3.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Specification***

The disclosure is objected to because of the following informalities:

Throughout the specification the reference number for the antenna (240 or 340) are referred to as “antenna” or “conductor”. The examiner suggests using antenna throughout the specification.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 27 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear as to what linear extension of the antenna Applicant is referring to. Is

Applicant referring to a half wavelength extension of the antenna into the dielectric body

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located at the distal end portion of the elongate device? If so, Applicant should clarify the claim language.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-6 and 13-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Carl et al. (USPN 6,047,216).

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Regarding claim 1, Carl et al. disclose an elongate device (20) comprising an antenna (distal portion of 314) at its tip or distal end and a dielectric body (distal portion of 316 located along the length of 322) surrounding the antenna, see col. 14-16 and figure 3.

Regarding claim 2-6, Carl et al. disclose the claimed invention. Carl et al. disclose that the frequency range is 3 GHz to 300 GHz which yields a wavelength range of roughly 1 mm to 100 mm. Here the major dimension of the antenna is the length coinciding with the length of (322). Additionally, Carl et al. disclose that the diameter of the catheter or elongate device is 2 millimeters, see abstract, col. 15, lines 21 and 22 and figure 2.

Therefore the wavelength of radiation may be 2mm and dielectric body extension away from the antenna roughly corresponds to the radius of the elongate device which is 1 mm which is half the wavelength of radiation.

Regarding claims 13 and 16-18, Carl et al. further disclose that a rounded, substantially hemispherical tip portion which is an extension of the dielectric body extends beyond the end of the antenna, see figure 3. Additionally, since the operating wavelengths of radiation are in the range of roughly 1 mm to 100 mm, it is trivial to verify that the rounded, substantially hemispherical tip portion has a radius of between 0.5 mm to 1 mm.

Regarding claim 14, Carl et al. disclose a pointed tip (distal end adjacent to section 322).

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Regarding claim 15, Carl et al. disclose a tip portion comprised of a different material (metal choke 318) from the dielectric body, see col. 15, line 57 through col. 16, line 17 and figure 3.

Regarding claim 19, Carl et al. further disclose that the antenna is the distal extension of an inner conductor (314) of a coaxial conductor (310), wherein the inner conductor (314) extends longitudinally further than the outer conductor (312), see col. 15, line 57 through col. 16, line 17 and figure 3.

Regarding claim 20, Carl et al. disclose the claimed invention. Carl et al. disclose that the frequency range is 3 GHz to 300 GHz which yields a wavelength range of roughly 1 mm to 100 mm. It is well known in the art to use dielectric materials with a dielectric constant value between 2 and 4. Therefore, the within the dielectric material the wavelength range is roughly 0.25 mm to 50 mm. Additionally, the examiner interprets the use of the "substantial" as within a factor of 10. This means that as long as the length of the antenna falls within a range of 0.025 mm to 5 cm the disclosure by Carl et al. meets the claim, which it inherently does.

Claims 23-35 and 38-43 are rejected under 35 U.S.C. 102(e) as being anticipated by Berube (USPN 6,287,302 B1).

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Regarding claims 23 and 38, Berube disclose an elongate device (10) comprising an antenna (distal end portion of 17) at its distal end portion and a dielectric body (30) surrounding the antenna so as to enhance transmission of radiation in the forward direction, see col. 5 and 6 and figures 1-5. Berube also discloses that the device be used for generating microwave radiation, see col. 2-6.

Regarding claims 24 and 25, Berube further discloses that the dielectric body (30) has a distal tip in the form of a round or circular shape, see figure 2. The examiner interprets the round/circular endface of the dielectric body to be a rounded tip in a broad sense. Additionally, Berube discloses that the "contact surface" (22) maybe curvilinear including "circular" which is hemispherical.

Regarding claims 26, 40 and 41, Berube discloses a tip that has a radius substantially equal to half the wavelength of the radiation in the dielectric, see col. 7, lines 39-43. The radius of the tip face is about one quarter of the wavelength of the radiation in the dielectric which is interpreted as substantially equal to half the wavelength of the radiation in the dielectric in that it is within a half of the wavelength of the radiation in the dielectric by a factor of 2. Berube further discloses that the operating frequency is in the range of 400 MHz to 6 GHz, see claim 2. Berube also discloses that the dielectric constant,  $\epsilon_a$ , of the dielectric body (30) is given by  $\epsilon_a = (\epsilon_l \epsilon_t)^{1/2}$ , where  $\epsilon_l$  is the dielectric constant of the line material and  $\epsilon_t$  is the dielectric constant of biological tissue. The value of  $\epsilon_t$  is roughly 80, while it is well known in the art to use line dielectric material



with dielectric constants,  $\epsilon_l$ , of 2. Therefore, is approximately equal to 12.65. From this we determine that the wavelength of operating frequencies in the dielectric body (30) is in the range of roughly 1.4 to 10.5 cm. One half of the minimum wavelength is 7 mm and one half of the maximum wavelength is 5.25 cm. Therefore, Berube shows the dielectric body having a substantially hemispherical tip portion with a radius substantially equal, which the examiner interprets as being within a factor of ten, to one half the wavelength of operating frequencies in the dielectric body.

Regarding claim 27, Berube discloses the claimed invention. Berube further discloses that the operating frequency is in the range of 400 MHz to 6 GHz, see claim 2. Berube also discloses that the dielectric constant,  $\epsilon_a$ , of the dielectric body (30) is given by  $\epsilon_a = (\epsilon_l \epsilon_t)^{1/2}$ , where  $\epsilon_l$  is the dielectric constant of the line material and  $\epsilon_t$  is the dielectric constant of biological tissue. The value of  $\epsilon_t$  is roughly 80, while it is well known in the art to use line dielectric material with dielectric constants,  $\epsilon_l$ , of 2. Therefore, is approximately equal to 12.65. From this we determine that the wavelength of operating frequencies in the dielectric body (30) is in the range of roughly 1.4 to 10.5 cm. Therefore, one half of the minimum wavelength is 7 mm and one half of the maximum wavelength is 5.25 cm. Therefore, if the operating wavelength of the radiation in the dielectric material is 7mm it meets the claim since the examiner interprets the use of the “substantial” as within a factor of 10.

Regarding claim 28, Berube discloses a dielectric body that has a substantially cylindrical portion (the slanted conical or cone-like side defined by (16)). This is interpreted as substantially cylindrical portion since Berube discloses that the cone-like side has a minimum half-angle of 15°, see col. 7, lines 29-39.

Regarding claims 29 and 43, Berube further discloses that the operating frequency is in the range of 400 MHz to 6 GHz, see claim 2. Berube also discloses that the dielectric constant,  $\epsilon_a$ , of the dielectric body (30) is given by  $\epsilon_a = (\epsilon_l \epsilon_t)^{1/2}$ , where  $\epsilon_l$  is the dielectric constant of the line material and  $\epsilon_t$  is the dielectric constant of biological tissue. The value of  $\epsilon_t$  is roughly 80, while it is well known in the art to use line dielectric material with dielectric constants,  $\epsilon_l$ , of 2. Therefore, is approximately equal to 12.65. From this we determine that the wavelength of operating frequencies in the dielectric body (30) is in the range of roughly 1.4 to 10.5 cm. Therefore, one half of the minimum wavelength is 7 mm and one half of the maximum wavelength is 5.25 cm. The device disclosed by Berube shows the dielectric body having surface locations (locations signifying different locations along the cone-like surface) extended from the antenna substantially, which the examiner interprets as being within a factor of ten, equal to one half the wavelength of the radiation in the dielectric.

Regarding claim 30, Berube disclose a device and method of radiating biological tissue using an antenna (distal end portion of 17) surrounded by a dielectric body (30), see col. 5 and 6 and figures 1-5. Berube also discloses that the device be used for generating

microwave radiation, see col. 2-6. Additionally, Berube discloses that a first and second dielectric material with two distinct dielectric constants are chosen such that at least partial “resonance” of the electromagnetic wave radiation is accomplished, see col. 2, lines 38-47. The physical phenomenon of resonance can only be accomplished if the cavity (the dielectric body) is large enough to contain a significant [portion of the electromagnetic radiation wavelength.

Regarding claim 31, Berube discloses the claimed invention. Again resonance of the electromagnetic radiation of this horn antenna is based on the dielectric material constants and also on the physical dimensions of the antenna. This is an inherent aspect of antenna design.

Regarding claims 32, 33 and 35, Berube further discloses that the dielectric body (30) extends from the antenna at least an distance equivalent to  $2L^2/\lambda$ , where  $L$  is the length of the antenna (the difference in distance between  $L_a$  and  $L_h$ , see figure 3) and  $\lambda$  is the wavelength of the radiation in the dielectric material. Additionally, Berube further discloses that the operating frequency is in the range of 400 MHz to 6 GHz, see claim 2. Berube also discloses that the dielectric constant,  $\epsilon_a$ , of the dielectric body (30) is given by  $\epsilon_a = (\epsilon_l \epsilon_t)^{1/2}$ , where  $\epsilon_l$  is the dielectric constant of the line material and  $\epsilon_t$  is the dielectric constant of biological tissue. The value of  $\epsilon_t$  is roughly 80, while it is well known in the art to use line dielectric material with dielectric constants,  $\epsilon_l$ , of 2. Therefore, is approximately equal to 12.65. From this we determine that the wavelength

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of operating frequencies in the dielectric body (30) is in the range of roughly 1.4 to 10.5 cm. Therefore, one half of the minimum wavelength is 7 mm and one half of the maximum wavelength is 5.25 cm. Therefore, if the operating wavelength of the radiation in the dielectric material is 7mm it meets the claim since the examiner interprets the use of the “substantial” as within a factor of 10.

Regarding claim 34, Berube further discloses that the tip of the device is placed against the biological tissue, see col. 7 and 8. Because electromagnetic radiation is a field that falls off (field amplitudes decrease) as the point of observation is moved away from the radiating antenna, most of the far-field radiation region lies within the biological tissue.

Regarding claim 39, Berube further disclose a means for partially reflecting internally radiation into the dielectric body via the outer conductor (16), see col. 2-6 and figures 1-5.

Regarding claim 42, Berube discloses the claimed invention. Berube further discloses that the operating frequency is in the range of 400 MHz to 6 GHz, see claim 2. Berube also discloses that the dielectric constant,  $\epsilon_a$ , of the dielectric body (30) is given by  $\epsilon_a = (\epsilon_l \epsilon_t)^{1/2}$ , where  $\epsilon_l$  is the dielectric constant of the line material and  $\epsilon_t$  is the dielectric constant of biological tissue. The value of  $\epsilon_t$  is roughly 80, while it is well known in the art to use line dielectric material with dielectric constants,  $\epsilon_l$ , of 2. Therefore, is approximately equal to 12.65. From this we determine that the wavelength of operating

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frequencies in the dielectric body (30) is in the range of roughly 1.4 to 10.5 cm.

Therefore, one half of the minimum wavelength is 7 mm and one half of the maximum wavelength is 5.25 cm. Therefore, if the operating wavelength of the radiation in the dielectric material is 7mm it meets the claim since the examiner interprets the use of the “substantial” as within a factor of 10.

Claim 44 is rejected under 35 U.S.C. 102(b) as being anticipated by Kasevich et al. (USPN 6,097,985).

Regarding claim 44, Kasevich et al. disclose a device and method of treating tumors (see col. 15, lines 1-67) by providing an elongate body (200) with a pointed tip (distal end tip of 203) for insertion into the liver, and a microwave power generator (inherent since a microwave antenna is used) in order to irradiate a liver tumor where the steps include inserting the pointed tip into the tumor in the liver and transmitting microwaves to heat tumor, see col. 5-15.

***Allowable Subject Matter***

Claims 7-12, 21, 22, 36 and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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*Conclusion*

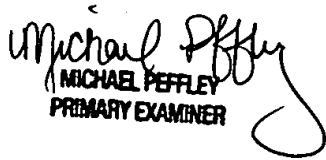
It should be noted that the examiner has interpreted "substantially" in a broad sense and if this broad sense interpretation is quantified the examiner interprets "substantially" to mean within a factor of 10 to 100.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron Roane whose telephone number is (703) 305-7377. The examiner can normally be reached on 9am - 5pm, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Linda Dvorak can be reached on (703) 308-0994. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A.R.   
February 22, 2004

  
MICHAEL PEFFLEY  
PRIMARY EXAMINER